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ABSTRACT

In an investigation of social inference (the ability to decode and comprehend cues), prompt questions of decreasing cognitive complexity were employed to train 60 mildly mentally retarded adolescents to logically interpret pictorial stimuli. Cartoon line drawings were used illustrating social situations representing a variety of family and peer interactions. Three levels of prompts, beginning at a low level and proceeding to higher levels, were employed. Analysis of pre- and post-training scores on the Test of Social Inference indicated positive changes as a result of training. The main effect for number of sessions was not significant, nor was the interaction of condition by number of sessions. It appeared that only the middle and high level mental age groups benefited from training. (CL)

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Training Social Inference in Mentally Retarded Adolescents

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Running Head: Training Social Inference

Paper presented at the Annual Meeting of the American Association on Mental Deficiency, 107th, Dallas, Texas May 29-June 2, 1983

Abstract

The ability to decode and comprehend cues may be termed social inference and is an integral component of socially competent behavior. Prompt questions of decreasing cognitive complexity were employed to train mildly mentally retarded adolescents to logically interpret pictorial stimuli. Results measured by the Test of Social Inference indicated positive changes as a result of training. The discussion analyzes results relative to length of training and possible critical mental age levels which may be more responsive to this form of cognitive training. Implications for future research are included.

TRAINING SOCIAL INFERENCE IN MENTALLY RETARDED ADOLESCENTS

Mentally retarded individuals can be characterized as exhibiting maladaptive behavior. A crucial component of adaptive social behavior, and ultimate social competence, appears to be social inference (Greenspan, 1979) which has been described as the comprehension of social cues whose interpretation indicates the probabilities of certain actions occurring in a social situation. It has been shown that a lack of social competence appears to be a factor in the failure of many mentally retarded individuals to succeed in school (Blacher-Dixon, Leonard, & Turnbull, 1981) as well as in the community (Edgerton, 1967; Kolstoe, 1961; McCarver, & Craig, 1974; Rosen, Clark, & Kivitz, 1977; Sali & Amir, 1970; Willer & Intagliata, 1981). However, current special educational practices have not adequately employed methods to insure a level of competency required for effective integration of retarded individuals. In spite of the availability of a variety of social skills training programs (Davis, 1977; Day, Lindeman, Powell, Fox, & Shores, 1983; Ellenberg, 1978; Hasselbring, 1979; Riches, 1980), Gresham (1982) in a review of research on mainstreaming concluded that mentally handicapped students continue to be socially rejected in school.

Many mental retardation professionals assume that social competency is limited by intellectual capacity. Thus, many training studies have focused on such practical skills as eye

contact, posture, and gestures (e.g., Bornstein, Bach, McFall, Friman, & Lyons, 1980). However, other theoreticians and researchers have recently proposed that individual intelligence may be increased through strategy training and experience (Campione & Brown, 1979; Farb, Cottrell, Montague, & Throne, 1977; Feuerstein, Rand, Hoffman, & Miller, 1979). Efforts to train intelligence have been conducted by Borkowski and Konarski (1981), Brown and French (1979), Nickerson (1981), Sabatino, Miller and Schmidt (1981) and Sternberg (1981).

In concert with efforts to train intelligence in general, cognitive approaches to train social intelligence have been developed. Fleming and Fleming's (1982) cognitive rehearsal technique and Ross and Ross's (1978) generation of alternative solutions program are examples of social skill improvement in mentally retarded children through cognitive training.

With the recognition that competent social functioning involves numerous constructs, among them social cue discrimination, interpersonal preception, role taking, and perspective taking, social inference appears to be an essential component of each construct. Social inference is the comprehension of social cues involving perspectives, interrelationships, and causality of both people and the environment. A competent social individual can integrate and comprehend the covert and overt messages that are found in a social situation in order to make a decision for appropriate action (Edmonson, deJung, Leland, & Leach, 1974). Inference requires understanding of what each cue implies beyond

that which is merely perceived. Without social inference, the detection, comprehension, and decoding of social signals may result in action which is inappropriate. Since many mentally retarded individuals display impulsive and inappropriate social behaviors, in part through a deficiency in the discrimination, comprehension, and decoding of salient social cues, it appears axiomatic that they possess weak social inference abilities.

The inappropriate social behaviors of mentally retarded individuals, coupled with the general lack of success of practical social skills training programs, indicate a need to explore and develop alternative training methods. A cognitive approach to social skill training may prove successful in developing generalizable component skills to foster more successful social functioning in retarded individuals. While cognitive training may require modification according to learner characteristics such as age, prior knowledge, motivational level, and cognitive capacity (Harris, 1982), it is considered the most potentially viable technique to promote generalizable social competence (Kneedler, 1980).

The major purpose of this study was to train social inference in mentally retarded adolescents using cognitive training principles in the form of "higher order" questions. Employing a pictorial format of a social situation, subjects were asked open-ended questions designed to require them to attend, decode, and interrelate social cues depicted in the situation in order

to create and support an interpretation with logically reasoned evidence. Social inference was measured by the Test of Social Inference (TSI)(Edmonson, deJung, Leland, & Leach, 1974).

Design

The design of the study was 2x3 factorial with condition and number of session as the independent variables. Condition included two levels: training and no training. Number of session included: one, three, or six for each condition. The primary dependent variable was the subject's score on the TSI. (For comparative purposes, a no-exposure to experimental procedure group was employed and received only the dependent measure.)

Subjects

A pool of 145 subjects with chronological ages between 12 and 17 years and with recently tested individual intelligence test scores in the 50-70 range was selected from school records. Of these, 33 were eliminated because of lack of parental permission and 25 were eliminated based on teacher ratings of severe language and/or emotional problems. From the resultant sample of 87 subjects, 60 individuals (38 males and 22 females) were randomly assigned to one of six experimental groups: training one-session, training three-sessions, training six-sessions, no training one-session, no training three-sessions,

no training six-sessions. There were 10 subjects in each experimental group. From the remaining 27 subjects, 10 were chosen at random to comprise the supplmentary TSI only group. The remaining 17 subjects were reserved as alternates. The subjects CA ranged between 12 and 17 years (mean = 14.9), IQ between 53 and 75 (mean = 68), and MA between 78 and 156 months (mean = 121). One way analyses of variance showed no significant difference among groups for IQ, CA, or MA.

Materials

Materials used in the study were cartoon line drawings (Keane, 1973; 1980), illustrating a social situation representing a variety of family and peer interactions. A pool of 69 drawings was rated by four judges along the dimensions of clarity, inference difficulty, amount of role taking required, and number of cues required in order to form an appropriate response. Judges were teachers of adolescent mildly mentally retarded students. The item validation used a Likert-type scale with five points. After being exposed to four illustrative items of the extreme points of the scale, each judge individually rated all items. Thirty-six items were selected on the basis of the rating data: items rated at the extreme points of the scale were discarded. The 36 items were distributed equally into six training booklets and counterbalanced for inference difficulty and number of cues required.

Procedure

All Conditions

All subjects were individually administered the procedures. All sessions were audio tape recorded. Subjects were instructed that the experimenter would show them several pictures and ask some questions after each picture was shown. The experimenter developed a rapport with each subject prior to showing the pictures. Each session utilized one booklet containing six picture items. All subjects received identical directions. Session duration ranged from 4 to 12 minutes.

At the conclusion of each subject's final session, the TSI was administered by a second experimenter who was blind to the subject's condition. Each TSI administrator used comments intended to sustain the subject's motivation during the test; however, no comment contained informational content on the correctness of the responses.

Training Condition

Training condition subjects received warm-up items on which they were encouraged to respond. They were reinforced for looking carefully at the drawings. When a subject was hesitant, the experimenter modeled several answers to the prompt questions and then asked the subject to restate the responses thought to be appropriate. Subjects were told to put cues together and tell how they made a story; subjects were encouraged to attend to cues and verbalize relationships.

All reasonable responses were accepted.

The major component of the social inference training was the prompt question. Prompts were made at three levels of specificity, beginning at a low level and proceeding to higher levels. First level prompts included: "What's happening here?" and/or "Why?", focusing only on the general gestalt of the item. Second level prompts are: "What's happening to the snowman?" and "What are the children doing?" Third level prompts focused the subject's attention on specific, relevant, pictorial cues. Third level prompts directed attention toward the essential cue necessary to make an appropriate inference. "What are the scissors for?" and "Why is there water on the ground?" are examples of third level prompts.

Prompt questions were asked in ascending order of specificity. When a first prompt did not elicit an appropriate response, a second level prompt was given; when a second level prompt was inadequate, a third level prompt was employed. Furthermore, each appropriate response was followed by returning to a less specific level prompt until the appropriate inferential response was made or all third level prompts were exhausted, whichever came first. The intention in the training was to give only the minimum, and lowest level or least specific, prompts necessary to elicit the final, appropriate inferential response.

No-Training Condition

No-training condition subjects received directions for the task that were identical to those for the trained subjects.

However, warm-up items and training with second and third level prompts were excluded. Subjects were simply asked the first level prompt question, "What's happening here?". As in the training condition, the TSI was administered at the end of the first final session for each subject.

TSI Only Condition

Subjects in this condition received only the TSI. They were not exposed to any materials employed in the two conditions described above.

Results

Cell means and standard deviations for the scores on the TSI are reported in Table 1. A 2 (condition: training vs. no-training) x 3 (number of sessions: one, three, six) factorial analysis of variance was performed on the data. The main effect for condition approached a significance level of $p \leq .05$ [$F(2,54) = 3.58$, $p < .06$] with the training condition subjects scoring higher on the TSI than the no-training condition subjects. The main effect for number of sessions was not significant [$F(2,54) = 1.75$, $p < .18$] nor was the interaction of condition by number of sessions [$F(2,54) = .15$, $p < .86$].

(Insert Table 1 About Here)

Since the effect of training was so close to the $p = .05$ level (a post-hoc ANOVA showed that including one additional subject in each cell, scored at the cell mean, would have

resulted in an .05 level of significance) correlations were run on the dependent variable (TSI score) and several subject characteristics: sex, school, IQ, CA, and MA. Significant correlations ($p < .05$) included TSI with IQ ($r = .41$, $p < .001$), MA ($r = .44$, $p < .001$), and CA ($r = .24$, $p < .025$). Sex and school were not significant ($r = .18$ and $.03$ respectively). Since MA is a function of IQ and CA, and since it resulted in the highest correlation, further analysis was indicated. Therefore, subjects were placed in three MA groups based on their MA level. The three groups included: low MA (77-103 months), middle MA (104-130 months), and high MA (131-156 months).

To analyze for a comparison with the supplementary TSI-only group and for effect of MA level, a 3 (Condition: training, no-training, and TSI-only) x 3 (MA level: low, middle, and high) factorial analysis of variance was utilized. The analysis resulted in a main effect for MA [$F(2.62) = 5.88$, $p < .01$]; however, the effect of condition was not significant [$F(2.62) = 1.46$, $p < .24$], nor was the interaction of MA and Condition [$F(3.62) = 1.23$, $p < .30$]. A follow-up Newman-Keuls procedure on the main effect of MA indicated that the low MA group scored significantly below both the middle and high MA groups with no significant difference between the latter.

A fourth ANOVA was done using MA (low, middle, and high) and Number of Session (zero, one, three, and six) as the independent variables. (Note: Zero session denotes TSI-only subjects.) Again, the main effect of MA was insignificant [$F(2.59) = 7.89$, $p < .001$] while the main effect of Sessions and the MA x Sessions

interaction failed to reach significance. Table 2 contains the data on TSI means and standard deviations for Condition by MA level and Number of Session by MA level. Follow-up Newman-Keuls Test showed identical paired comparisons for MA levels in the previous analysis that included Condition and MA level.

(Insert Table 2 About Here)

Total first, second, and third level prompts were analyzed to determine if fewer total prompts were necessary within or across sessions. Total number of prompts steadily decreased over the first five sessions. However, an increase was noted in the total number of prompts for session six. The proportion of second and third level prompts to the total number of prompts varied considerably over the sessions. No discernible trends were discovered in the prompt data. Table 3 presents a summary of the prompt data by level of prompt and number of sessions.

(Insert Table 3 About Here)

Lastly, data were analyzed for the accuracy of response to the stimulus items during the training and no-training condition procedures. Training condition subjects averaged 85 per cent appropriate responses; 78, 92, and 84 per cent respectively for the one, three, and six session subjects. No-training condition subjects averaged 35 per cent correct responses; 33, 33, and 40 per cent respectively for the one, three, and six session subjects.

Discussion

The fact that the effect of a relatively short cognitive training program approached significance of $p<.05$ should be viewed as an encouraging indication of improvement in social inference as a result of a cognitive training technique. A relatively major problem appears to be the great variability of TSI scores across subjects who received the training and even within training groups that received the same number sessions. No strong rationale for employing any of the standard transformations of the scores could be developed. Although variability within any one cell was high, variability across cells was minimal. A standard deviation of 11.55 as an average for all subjects, when cell means ranged from 37.3 to 50.2, may have precluded obtaining a stronger training effect. Supplementary data presented in the results, particularly the MA level and proportion of correct responses made during training, relative to the no-training condition, is further evidence to promote this social skills training method.

It appears from the results of the MA analysis that only the middle and high level MA groups may have benefited from the training. This is further evidence that even six sessions of such training may be insufficient in promoting such a complex skill as social inference. The success of programs employing cognitive training techniques (Edmonson, Leland, & Leach, 1969; Feuerstein, Rand, Hoffman, & Miller, 1980) may be explained, in part, through their lengthy training programs that are measured in weeks, months, and sometimes years rather

than in days and sessions. Research utilizing cognitive training techniques for teaching social behavior (Ross & Ross, 1973; 1978) have frequently been programs of several months duration.

The data from this study may be indicating a mediational inefficiency on the part of some subjects. Any initial use of a new cognitive strategy would result in fluctuations in performance, especially in subjects whose limited intellectual level makes any strategic functioning difficult. Use of a higher order strategy requires substantial cognitive effort. Only if strategy usage is automatic will significant improvement in performance occur, especially on a task where generalization of training is assessed. In fact, the negligible difference between the three-session and six-session training condition subjects may be reflecting a normal plateau in strategy acquisition in which a newly acquired strategy is being practiced.

A critical difference between the training procedures and the administration of the TSI was in the experimenter's feedback to the subjects' responses. Zigler (1971) has characterized mentally retarded children as being outer-directed and as possessing an expectancy of failure. This would be particularly true for mildly retarded adolescents who often experience many years of failure in school. The inclusion of information feedback throughout all phases of the training may have provided these adolescents with the necessary information to realize that they were employing the strategy successfully as well as probably

increasing the motivation and interest in the task. Positive reinforcement and praise produced feedback and motivation on satisfactory performance which in turn enabled subjects to function more effectively. Furthermo anecdotal observation suggests that the TSI administration, time ranging from 18 to 32 minutes, was apparently a difficult and somewhat discouraging task for some subjects. Over the course of the TSI, subjects were observed to become fatigued, inquired when they would be finished, and appeared discontent. Some subjects appeared to give fewer responses as the TSI progressed, thus the possibility of earning partial credit for items was reduced. In future studies employing mentally retarded subjects, it may be more valid to administer the TSI over two sessions rather than in a single session in order to reduce cumulative discouragement as well as incomplete answers.

Theoretically, the results of this study imply that social inference, as a foundational component of adaptive behavior, is modifiable. Mentally retarded subjects may, in fact, improve their adaptive behavior through training targeted at teaching them how to interrelate and comprehend cues in an interpersonal situation. However, the effects of differential lengths of training remain unclear. Research currently in progress has been designed to answer these issues.

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Table 1

Means and Standard Deviations (SD) of Test of Social Inference Scores (TSI)* by Condition and Number of Session

		Training			No-Training		
		n	Mean	(SD)	n	Mean	(SD)
Number of Session	One	10	43.3	(11.8)	10	37.3	(10.7)
	Three	10	49.5	(11.1)	10	45.0	(12.8)
	Six	10	50.2	(9.3)	10	42.0	(14.4)

Supplementary Group TSI Only n = 10 Mean - 41.5 (SD) = 10.7

* Note: Scores on TSI range from zero to 104.

Table 2

Means of TSI Scores by:

(A) MA Level and Condition, and (B) MA Level by Number of Section

2A

		Condition					
		Training		No-Training		TSI-Only	
		n	Mean	n	Mean	n	Mean
Mental Age Level	Low	2	30.25	6	31.17	0	
	Middle	19	46.21	18	43.78	9	42.94
	High	9	53.78	6	44.58	1	28.00

2B

		Number of Session							
		0		1		3		6	
		n	Mean	n	Mean	n	Mean	n	Mean
Mental Age Level	Low	0	0	2	31.50	3	29.67	3	31.83
	Middle	9	42.94	13	41.31	12	47.13	12	46.96
	High	1	28.00	5	41.00	5	56.80	5	52.50

Table 3

Summary of Prompts by Level and Number of Sessions

Sessions	Level One Prompts	Level Two Prompts	Level Three Prompts	Total	2/Total	3/Total
One						
Σ	278	113	108	499		
$\bar{X}$	9.6	3.9	3.7	166	.22	.19
SD	1.9	1.7	3.2	79	.07	.12
Two						
Σ	107	64	85	356		
$\bar{X}$	10.9	3.8	4.5	181	.17	.23
SD	2.8	2.0	2.5	63	.05	.09
Three						
Σ	193	83	55	331		
$\bar{X}$	9.7	4.2	2.8	110	.23	.16
SD	2.6	2.9	1.9	59	.11	.08
Four						
Σ	91	31	41	163		
$\bar{X}$	10.1	3.4	4.6	54	.17	.23
SD	2.6	2.5	3.0	26	.09	.08
Five						
Σ	86	19	16	121		
$\bar{X}$	8.6	1.9	1.6	40	.14	.12
SD	1.3	1.4	1.4	32	.09	.09

Table 3 (continued)

Summary of Prompts by Level and Number of Sessions

Sessions	Level One Prompts	Level Two Prompts	Level Three Prompts	Total	2/Total	3/Total
Six						
Σ	124	37	78	236		
$\bar{X}$	13.8	4.1	8.7	79	.22	.32
SD	3.7	2.1	3.1	36	.19	.05
Overall						
Σ	979	347	383	1716		
$\bar{X}$	163	58	64	284	.19	.21
SD	69	33	30	127	.03	.06